

## AMENDED CLAIMS

[ received by the International Bureau on 15 December 2004 (15.12.04);  
original claim 1 amended, remaining claims unchanged. ( 1 page) ]

1. Gradient tensor induction magnetic field measuring apparatus for measuring the gradient tensor induction magnetic signal of the transient magnetic field in a borehole to be used to determine the conductivity gradient of the anisotropic earth formations penetrated by a wellbore, comprising any or any combination of a)-d), wherein:

a) at least one transmitter coil and a pair of closely located parallel tri-axial EM induction receivers, each formed by three mutually orthogonal receiver coils, separated by a small vector,  $\Delta r$ , wherein the distance between two parallel tri-axial EM induction receivers is much smaller than the distance  $L$  between the transmitter and the center of the vector  $\Delta r$ , connecting two receivers:  $\Delta r \ll L$ , in order that the conditions are fulfilled that the gradients are measured of the different components of the magnetic field induced in the earth formation;

b) at least one receiver coil and a pair of closely located parallel tri-axial EM induction transmitter coils, separated by a small vector,  $\Delta r$ , wherein the distance between two parallel tri-axial EM induction transmitters is much smaller than the distance  $L$  between the receiver and the center of the vector  $\Delta r$ , connecting two transmitters:  $\Delta r \ll L$ , in order that the conditions are fulfilled, based on the reciprocity principal, that the gradients are measured of the different components of the magnetic field induced in the earth formation;

c) a tri-axial EM induction transmitter formed by three mutually orthogonal transmitter coils, and a pair of closely located tri-axial EM induction receivers, each formed by three mutually orthogonal receiver coils, separated by a small vector,  $\Delta r$ , wherein the distance between two tri-axial EM induction receivers is much smaller than the distance  $L$  between the tri-axial transmitter and the center of the  $\Delta r$ ,  $\Delta r \ll L$ , in order that the conditions are fulfilled that the gradients are measured of the different components of the induction tensor formed by the magnetic fields induced in the earth formation;

d) a pair of closely located tri-axial EM induction transmitters, separated by a small vector,  $\Delta r$ , and a tri-axial EM induction receiver, wherein the distance between two tri-axial EM induction transmitters is much smaller than the distance  $L$  between the tri-axial receiver and the center of the vector  $\Delta r$ ,  $\Delta r \ll L$ , in order that the conditions are fulfilled, based on the reciprocity principal, that the gradients are measured of the different components of the induction tensor formed by the magnetic fields induced in the earth formation; and

e) means for receiving voltages induced in said receiver coils;

f) means for measuring a difference between the said voltages in the different pairs of the receivers, or due to the different pairs of the transmitters.